UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDREW A. ADAMCZYK, CHRISTIAN THOMAS GORALSKI, JR. and WILLIAM P. BOONE

Appeal No. 2005-1236
Application No. 10/065,796

ON BRIEF

Before KIMLIN, PAK and TIMM, *Administrative Patent Judges*.
PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 25, which are all of the claims pending in the above-identified application.

According to appellants (Brief, page 3), "[c]laims 1-25 stand together." Therefore, for purposes of this appeal, we select claim 1 as representative of all the claims on appeal and decide the

propriety of the examiner's rejections below based on this claim alone in accordance with 37 CFR § 1.192(c)(7) (2003) and 37 CFR § 41.37(c)(1)(vii)(2004). *See In re McDaniel*, 293 F.3d 1379, 1384, 63 USPQ2d 1462, 1465-66 (Fed. Cir. 2002). Claim 1 is reproduced below:

> 1. A method for removing low molecular weight hydrocarbons from an exhaust gas of an internal combustion engine, the method comprising:
>
> a) contacting the exhaust gas with a water-removing composition; and
>
> b) contacting the exhaust gas at a position downstream from the water-removing composition with a hydrocarbon-removing material to remove at least some of the hydrocarbons from the exhaust gas;
>
> wherein the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250°C.

In support of his rejections, the examiner relies on the following prior art references:

Minami et al. (Minami)	5,140,811	Aug. 25, 1992
Hertl et al. (Hertl)	5,417,947	May 23, 1995

Claims 1 through 25 stand rejected under 35 U.S.C. § 102(b) as anticipated by the disclosure of Hertl. Claims 1 through 25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combined disclosures of Hertl and Minami.

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments advanced by both the examiner and appellants in support of their respective positions. This review has led us to conclude that the examiner's Sections 102(b) and 103(a) rejections are well founded. Accordingly, we will sustain the examiner's Sections 102(b) and 103(a) rejections for essentially those reasons set forth in the Answer and below.

We note that Hertl teaches a method for removing low molecular weight olefins from an exhaust gas mixture from an internal combustion engine, wherein the exhaust gas mixture is contacted with a hydrophilic material (a water trap) to remove water and then with a hydrocarbon-removing material (a hydrocarbon trap) to remove the low molecular weight olefins. See column 1, lines 50-60. Water is removed first from the exhaust gas mixture since it "strongly inhibits the adsorption capacity of some zeolites, especially olefins." See Hertl, column 1, lines 41-45. Indeed, the examiner finds (the Answer, page 3 and the final Office action dated January 15, 2004, pages 2-3), and the appellants do not dispute (the Brief, pages 3-8 and the Reply Brief, pages 1-3), that Hertl expressly teaches "all of the limitations of the claims except" for the claimed limitation "the hydrocarbon-removing

material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular weight hydrocarbons desorb from the hydrocarbon-removing material at a temperature of 250°C."

The dispositive question in this case is, therefore, whether Hertl teaches or would have suggested employing a hydrocarbon-removing material capable of performing the claimed function.[1] On this record, we answer this question in the affirmative.

As is apparent from the actual experiments exemplified in Hertl, ZSM-5 zeolite (pentasil zeolite) having a Si to Al mole ratio of 26 is employed downstream of a water removing composition to remove light hydrocarbons. See column 10, Examples 1-3. We determine that this ZSM-5 zeolite is encompassed by the claimed hydrocarbon-removing material (i.e., a hydrocarbon-removing material having the claimed function) as defined by the appellants at pages 6 and 7 of the specification. Specifically, we find that the specification describes a hydrocarbon-removing material having the claimed function as follows (pages 6 and 7):

> a hydrocarbon trap comprising a hydrocarbon-removing material having a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing material at a temperature of about 250°C. Moreover, the hydrocarbon trap is located

---

[1] We need not discuss the content of Minami since it is, at best, cumulative.

> downstream from the water trap in the vehicle exhaust system. More preferably, the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of about 275°C; and, most preferably, the hydrocarbon-removing material has a sufficiently low Si to Al atom ratio that less than about 50% of the low molecular hydrocarbons desorb from the hydrocarbon-removing composition at a temperature of about 300°C. The hydrocarbon removing material will preferably comprise SiO_2 and Al_2O_3. More preferably, the hydrocarbon-removing material is a zeolite. Suitable zeolites include, but are not limited to, a pentasil zeolite, a faujasite zeolite, mordenite, a beta zeolite, ferriete, a mesopore zeolite, or mixtures thereof. In a particularly preferred variation of this embodiment, the zeolites have a Si to Al atom ratio less than about 25. More preferably, in this variation, the Si to Al atom ratio [is] less than about 15, and most preferably, the Si to Al atom ratio is less than about 10.

The appellants do not dispute the examiner's finding that the preferred low Si to Al *atom* ratio of less than about 25 disclosed at page 7 of the specification is equal to a low Si to Al *mole* ratio of less than about 50. Compare the Answer, page 4, with the Brief and the Reply Brief in their entirety. It follows that the hydrocarbon-removing material having the claimed function includes Hertl's pentasil zeolite (ZSM-5) having a low Si to Al mole ratio of 26, since according to pages 6 and 7 of the specification, a pentasil zeolite having a preferred low Si to Al atom ratio of less than about 25 (mole ratio of less than about 50) has the claimed function. The appellants have not shown that the pentasil zeolite exemplified in Hertl does not necessarily possess the claimed

function. *See In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1432 (Fed. Cir. 1997)("[W]here the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on").

Moreover, we find that Hertl teaches using a very limited number of zeolites as hydrocarbon-removing materials. Specifically, Hertl teaches (column 4, lines 5-12) that:

> Some preferred zeolites are faujasite type, especially preferred of which is ultra stable Y, (USY) preferably with SiO_2/Al_2O_3 mole ratios of greater than about 5, pentasil type, preferred of which are ZSM type such as ZSM-5, most preferred of which have SiO_2/Al_2O_3 mole ratios of greater than about 25, and mordenite, and beta zeolite, and combinations of these.

Hertl then goes onto exemplify four pentasil zeolites (ZSM-5), one beta zeolite, two faujasites (ultra stable y zeolites) and one mordenite. See Table 2, columns 5 and 6. Of these eight exemplified zeolites, four have Si to Al mole ratios of less than 50 (atom ratio of less than about 25). *Id.* Thus, we concur with the examiner that even without the actual experiments discussed in Hertl, one of ordinary skill in the art would have readily

envisaged the mordenite, beta zeolite, ZSM-5 and ultra stable Y zeolite encompassed by the claimed hydrocarbon-removing materials from the very limited number of the preferred zeolites exemplified in Hertl within the meaning of 35 U.S.C. § 102(b). *In re Schaumann*, 572 F.2d 312, 315-16, 197 USPQ 5, 8-9 (CCPA 1978)(holding that "the disclosure of a chemical genus . . . constitute[s] a description of a specific compound" within the meaning of Section 102 where the specific compound fall within a genus of a "very limited number of compounds."); *see also In re Petering*, 301 F.2d 676, 682, 133 USPQ 275, 280 (CCPA 1962).

In any event, we determine that Hertl would have at least suggested the claimed subject matter within the meaning of 35 U.S.C. § 103 based on the above disclosure. *See In re Arkley*, 455 F.2d 586, 587, 172 USPQ 524, 526 (CCPA 1972). One of ordinary skill in the art would have been led to employ the eight zeolites exemplified by Hertl, inclusive of the claimed zeolites, with a reasonable expectation of effectively removing light hydrocarbons from internal combustion engine exhaust gases.

In view of the forgoing, we affirm the examiner's decision rejecting the claims on appeal under Sections 102(b) and 103(a).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN)
Administrative Patent Judge)
)
)
)
) BOARD OF PATENT
CHUNG K. PAK) APPEALS
Administrative Patent Judge) AND
) INTERFERENCES
)
)
CATHERINE TIMM)
Administrative Patent Judge)

CKP/hh

Appeal No. 2005-1236
Application No. 10/065,796

BROOKS KUSHMAN P.C./FGTL
1000 TOWN CENTER
22ND FLOOR
SOUTHFIELD, MI 48075-1238